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Theory of Raman response of a superconductor with extended s -wave symmetry: Application to the iron pnictides

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Abstract

We argue that Raman study of Fe-pnictides is a way to unambiguously distinguish between various superconducting gaps proposed for these materials. We show that A1g Raman intensity develops a true resonance peak below 2Δ if the pairing gap has A1g symmetry in the folded Brillouin zone (Δ (k=0) =Δ,Δ (π,π) =-Δ). No such peak develops for a pure s -wave gap, a d -wave gap, and an extended s -wave gap with Δ (k) =Δcos kx 2 cos ky 2. We show that the peak remains quite strong for the values of interpocket impurity scattering used to fit NMR data. © 2009 The American Physical Society.

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